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ORIGINAL CONTRIBUTION

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Abstract In an epidemiological sample of children aged 6 to 17 a total of 1964 parents responded to the Child Behavior Check List (CBCL). A subgroup of 399 parents were interviewed with the Diagnostic Interview Schedule for Children (DISC). The mean syndrome scale scores in the various sex/age groups were in the lower range of several international studies using the CBCL. Effect analyses revealed sex to be more important than nationality (indigenous vs. immigrant) and age. All effects had to be considered as being small. Convergence between syndrome scales of the CBCL and interview-derived DSM-III-R diagnoses was good for three major groups of disorders.

Key words Epidemiology – behavioral and emotional problems – children – adolescents

Introduction

With his empirically based approach to assessment and taxonomy Achenbach has developed various instruments for the study of behavioral and emotional problems in children, adolescents, and even in young adults. The Child Behavior Checklist (CBCL), Teacher's Report Form (TRF), Youth Self-Report (YSR), and Young Adult Self-Report (YASR) (1–4) are widely used in research on psychopathology in the respective age groups. According to the bibliography by Brown and Achenbach (6), these instruments were used in more than a thousand studies with various clinical groups as well as in a considerable number of epidemiological projects. By 1991, the CBCL had been translated into 33 languages and used in 16 different cultures (2). The various cross-cultural comparisons of the CBCL (for a review see (18)) began with American and Dutch children. In the recent past, further reports on the CBCL from various European studies in Belgium (12), France (15), Germany (8), Greece (17), and Iceland (11) were published. The present contribution adds further data to these European studies by reporting findings from a Swiss epidemiological study that was recently performed in the Canton of Zurich, which is the most densely populated canton of Switzerland. In this paper we will provide data on the various syndromes of behavioral and emotional problems as assessed by the CBCL, the effects of sex, age, and nationality on syndrome scores, and the convergence of the syndromes with psychiatric diagnoses.

Method

Samples

The Zurich Epidemiological Study of Child and Adolescent Psychopathology (ZESCAP) is based on a sample of N=1964 pupils living in the Canton of Zurich, Switzerland who attended the first to ninth grade in various types of schools during 1994. Because of relatively late entry into school in Switzerland at the age of seven, the nine grades cover the age range from 7 to 16 years. However, there were also a few pupils aged 6 or 17. The cohort was a stratified randomized sample representing the twelve counties of the canton, the school grades, and all types of school, including schools for special education, primary schools, and secondary schools.

The design intended to investigate 1500 pupils. Taking an incomplete participation rate into account, over-sampling was performed. Therefore, based on 158 schools, 2831 parents were contacted. A total of 2243 (79.2%) of the parents were willing to participate in the study. The sample was reduced by 200 parents due to the following reasons: wrong stratum of schools (N=51), delayed or missing return of the questionnaire (N=118), and more than 10% missing items in the questionnaire (N=31). In this sample of 2043 participants the distribution of students across the various type of schools (i.e., primary schools, secondary schools, and schools for special education) was not yet representative in accordance with official census data. Thus, further N=79 subjects had to be randomly excluded. After adapting for the various school strata, a final number of 1964 parents remained in the sample. The latter had 1015 boys and 949 girls in the study. Statistical comparisons with official census data revealed that the final sample was representative for sex, the twelve counties, and the proportion of urban vs. rural place of residence. There were 269 immigrant parents in the sample. This sample proportion (13.7%), however, is significantly ($Chi2=85.6$, $df=1$, $p<0.001$) less than the total proportion (22.4%) in the population, according to official census data. The reasons for this low completion rate are unclear. It was definitely not due to language problems, because both the letter that introduced the study and the questionnaire were written in the respondents' native language. The following translations of the CBCL were used: Albanian, English, French, Greek, Italian, Portuguese, Serbo-Croatian, Spanish, and Turkish.

Procedure

Using a two-stage procedure, parents were asked to respond to the behavior problems section of the CBCL in the screening phase. The questionnaires were distributed via the teachers and sent back to the authors by mail. Various screens derived from the CBCL, the YSR, and further questionnaires for preadolescents and adolescents were applied in the ZESCAP (for a full description of details see (16)). Multiple successive screening resulted in 577 pupils (29.4% of the screened sample) who were screen positive. There were a total of 705 pupils for Stage 2 interviews with the parents, including a randomized control group of a further 128 pupils. However, only 399 parents (56.6% response rate) were willing to participate in the interviews. These parents were interviewed at a mean interval of eight months after the screening by a member of a team of 10 undergraduate clinical psychology students who were 'blind' to the 'subjects' screening scores. The Diagnostic Interview Schedule for Children (DISC 2.3) (14) was performed with the help of notebook computers and newly developed software. The interviewers were trained for both the clinical content and the technical procedures of the program, which was developed by our group. The algorithm of the program permitted the derivation of DSM-III-R diagnoses. In light of the fact that the interview was fully standardized and that the diagnoses were calculated according to an algorithm, it was felt that no additional reliability checks were warranted.

Results

Syndrome scores and effect analyses

The means and standard deviations for the eight syndrome scales, the second-order scales of internalizing and externalizing problems, and the total problem score are given in Table 1 where the two sexes and the two particular age groups, as documented in the manual of the CBCL (2), i.e., 6–11 and 12–17 years, are also considered. Based on multivariate analysis of variance (MANOVA) for the eight primary scales and univariate analyses of variance (ANOVA) for the second-order scales and the total problem score, there are several significant age/sex effects.

The score for somatic complaints was higher among older girls than in the other three subsamples. The two groups of male subjects had higher scores on both the attention problems and the delinquent behavior scales than the two groups of female subjects. Younger boys had higher scores on the aggressive behavior scale than the other three subsamples. This is also true for the externalizing scale where an additional contrast between higher score for older boys as compared to younger girls is noticeable. On the total problem score, younger boys scored higher than the two subsamples of female subjects.

In addition to the reported MANOVA and ANOVAs, separate analyses of covariance (ANCOVAs) were performed on the eight syndrome scales, the two second-order scales, and the total problem score in order to separately estimate the amount of variance explained by sex and age and, in addition, to control for nationality. Because of limited space, we do not report the same type of analyses for the specific problem items. In each ANCOVA, children were divided according to three independent variables: the two sexes, age, and nationality. The latter variable was treated as a covariate; Swiss and immigrant children were compared. In order to allow comparisons with similar analyses for other studies, the ANCOVAs were performed separately for the subsamples of the 6 to 11 year-olds and the 12 to 17 year-olds. In these analyses, age was classified by years with the six and seven year-olds and the 16 and 17 year-olds each combined into one group because of small subsample sizes.

European Child & Adolescent Psychiatry, Vol. 6, No. 3 (1997)

Table 1 CBCL scores for various sex and age groups

	A Boys 6–11 years (N=557)		B Girls 6–11 years (N=503)		C Boys 12–17 years (N=457)		D Girls 12–17 years (N=447)			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	p
Withdrawn	1.8	2.0	1.7	1.9	2.1	2.3	2.0	2.3	2.2	n.s.
Somatic Complaints	0.9	1.2	1.0	1.4	1.0	1.3	1.4	1.7	10.5	<0.001 (D>A,B,C)
Anxious/Depressed	2.8	3.1	2.9	3.3	2.8	2.8	2.7	3.4	0.2	n.s.
Social Problems	1.3	1.9	0.5	0.3	1.3	1.8	1.1	1.8	3.5	<0.02 (n.s.)
Thought Problems	0.5	1.0	0.3	0.9	0.4	0.9	0.5	1.2	3.1	<0.05 (n.s.)
Attention Problems	2.9	3.0	2.0	2.4	3.0	3.1	2.3	2.7	16.1	<0.01 (A,C>B,D)
Delinquent Behavior	1.6	1.8	1.0	1.4	1.6	1.8	1.4	2.0	14.3	<0.001 (A,C,D>B)
Aggressive Behavior	6.5	5.4	4.8	4.3	5.3	4.8	4.5	4.4	17.6	<0.001 (A>B,C,D)
Internalizing	5.5	5.3	5.7	5.5	5.9	5.2	6.0	6.5	0.9	n.s.
Externalizing	8.1	6.8	5.8	5.3	6.9	6.2	5.9	5.9	16.1	<0.001 (A>B,C,D; C>B)
Total Problems	21.1	16.3	17.9	14.2	19.7	15.1	18.0	16.5	5.1	>0.01 (A>B,D)

MANOVA for eight primary scales: Wilks Lambda=0.88, F=10.2, df=24/5665, p<0.001; n.s.=no significant contrasts (Scheffé Test)

Table 2 Percentage of variance accounted for by significant effects of sex, age and nationality in 6–11 year olds

Scale	Main Effects		Covariate Nationality
	Sex	Age	
Withdrawn			
Somatic Complaints	1 (F,°)		1 (CH,+)
Anxious/Depressed			
Social Problems	0.4 (M,°)	1 (O,+)	0.4 (IM,°)
Thought Problems	0.4 (M,°)		
Attention Problems	3 (M,*)	1 (O,°)	0.4 (IM,°)
Delinquent Behavior	3 (M,*)	1 (O,+)	1 (IM,+)
Aggressive Behavior	3 (M,*)		
Internalizing			
Externalizing	3 (M,*)		
Total Problems	1 (M,*)		

F=Girls scored higher; M=Boys scored higher; O=Older subjects (>=9 years) scored higher; CH=Swiss scored higher; IM=Immigrants scored higher
*p<0.001, +p<0.01, °p<0.05

Table 2 displays the findings for the younger subsample. Here, sex turns out to be the most important factor. With the exception of 'somatic complaints', where girls scored higher, there is clear evidence that the boys scored higher on various syndrome scales, i.e., 'social problems', 'thought problems', 'attention problems', 'delinquent behavior', and 'aggressive behavior'. Older children among the 6 to 11 year-olds had higher scores on the scales measuring 'social problems', 'attention problems', and 'delinquent behavior'. Swiss children scored higher on 'somatic complaints', whereas immigrant children showed more 'social problems', 'attention problems', and 'delinquent behavior'. However, according to Cohen's (7) criteria for ANCOVAs, all effects must be considered as being small (1 to 5.9% of variance). This applies also to the older age group of 12 to 17 year-olds for whom sex effects were significant. Only one percent of variance was accounted for by sex for 'somatic complaints' (higher score for girls), 'attention problems', 'aggressive behavior', and 'externalizing disorders' (higher scores for boys on the latter three scales).

Convergence of CBCL findings with diagnoses

The convergence between CBCL scores and DISC-derived DSM-III-R diagnoses is shown in Table 3. Only four diagnoses had sufficient sample sizes for these analyses: children without any disorder, those with anxiety disorders, those with ADHD, and those with the comorbid diagnosis of anxiety disorders and ADHD, resulting in a total of N=375 children with data suitable for analyses. As the table shows, the CBCL allowed a highly significant discrimination among these four groups. Fig. 1 displays the four profiles on the basis of standardized T-scores of the total epidemiological sample. Apparently, the profile of the group with no diagnosis comes very close to the ideal mean population norm of 50 on the T-scale. The profile of the anxiety disorders group shows the expected peak on the anxious/depressed scale and a good differentiation from the other profiles. The ADHD group again has the expected first peak on the attention problem scale and a second peak on the aggressive behavior scale. Finally, the comorbid group of anxiety disorders and ADHD shares many similarities with the two profiles of the two monodiagnostic groups inasmuch as almost all characteristics of the two groups are incorporated: it is indistinguishable from the anxiety group profile on the first three CBCL scales and indistinguishable from the ADHD group as regards the social problems scale and the last three CBCL scales assessing attention problems, delinquent behavior, and aggressive behavior. The only characteris-

Table 3 Convergence between CBCL syndrome scores an diagnoses

	A No diagnosis (N=272)		B Anxiety disorder (N=56)		C Attention deficit hyperactivity disorder (N=35)		D Anxiety disorder and Attention deficit disorder (N=12)			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	p
Withdrawn	2.37	2.49	4.23	2.98	3.15	1.91	3.42	2.07	9.04	<0.001 (B>A)
Somatic Complaints	1.28	1.48	2.27	2.31	1.80	2.16	2.33	1.72	6.53	<0.001 (B>A)
Anxious/Depressed	3.78	3.50	7.61	4.38	5.40	2.87	7.34	3.56	20.51	<0.001 (B,D>A;B>C)
Social Problems	1.64	2.01	2.21	1.85	3.46	3.02	3.92	3.14	11.25	<0.001 (C,D>A)
Thought Problems	0.57	1.06	1.24	1.52	0.98	1.12	2.75	2.42	16.19	<0.001 (D>A,B,C;B>A)
Attention Problems	3.51	3.07	5.22	2.73	8.14	3.23	8.76	3.42	34.76	<0.001 (B,C,D>A;C,D>B)
Delinquent Behavior	1.83	2.07	2.45	2.33	3.94	2.46	3.75	3.11	12.13	<0.001 (C,D>A;C>B)
Aggressive Behavior	6.36	5.21	8.67	5.66	13.93	5.81	13.71	6.49	26.67	<0.001 (B,C,D>A;C,D>B)
Internalizing	7.44	6.28	14.11	8.05	10.35	4.98	13.09	5.45	19.01	<0.001 (B,D>A)
Externalizing	8.20	6.73	11.12	7.39	17.87	7.57	17.46	9.42	25.52	<0.001 (B,C,D>A;C,D>B)
Total Problems	24.13	16.40	38.18	17.53	44.56	14.36	51.74	19.69	31.36	<0.001 (B,C,D>A)

MANOVA for eight primary scales: Wilks Lambda 0.60, F=8.39, df=24/1033, p<0.001

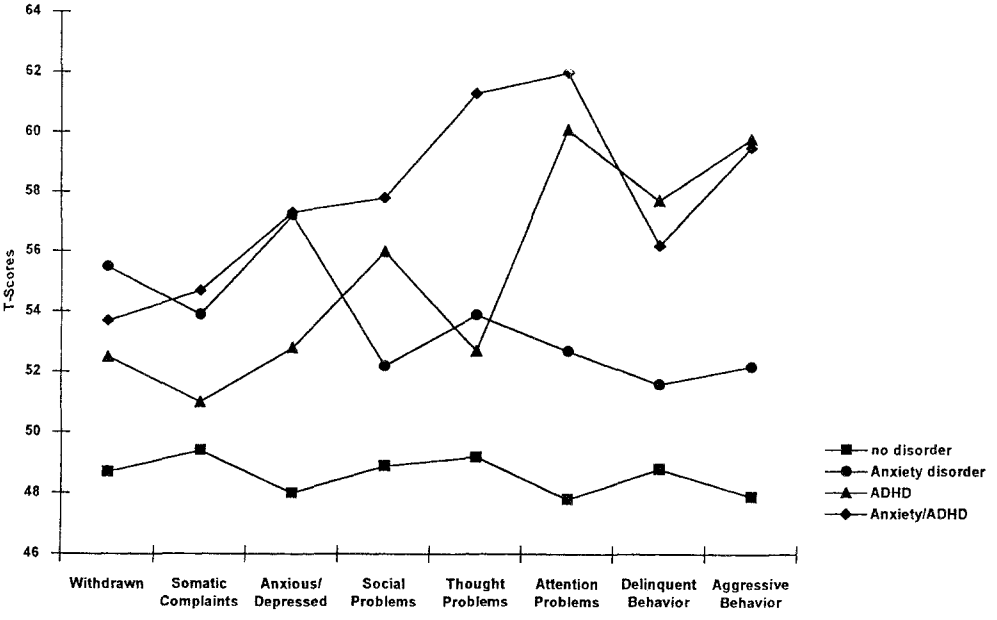

Fig. 1 CBCL profiles of four groups

tic of this group that is clearly different from all other profiles is the peak on the thought problem scale.

Discussion

The present report, which is based on an epidemiological sample from Switzerland, adds to various cross-cultural applications of the CBCL that have been made in the recent past. In their review, Verhulst and Achenbach (18) concluded that cross-cultural comparisons have yielded relatively small differences in problem rates as assessed by the CBCL. As shown in Table 4, when comparing our own findings to some recent results coming from studies with a similar age range and from various countries with similar socioeconomic conditions, we find the mean total problem scores of our own sample always in the lower range of the distribution for all sex/age groups, whereas the US-American samples always score significantly higher. Although the absolute degree of the differences is relatively small, this certainly supports the idea of national standardization of the CBCL in the various countries. This has also been accomplished for our own data because of the representative character of our sample. It has to be admitted that our definite completion rate was slightly lower than in some of the other countries. This may have also contributed to the differences in means.

Table 4 Cross-cultural comparison of CBCL total problem scores

	This Study (N=1964)	Germany (D) (N=1969)	The Netherlands (NL) (N=1698)	USA (N=2368)	Israel (IL) (N=1121)
Boys 6-11 years					
N	558	373	454	581	300
Mean	21.1	22.4	23.2	24.3	21.5
SD	16.3	15.0	17.3	15.6	13.9
Girls 6–11 years					
N	502	384	486	619	300
Mean	17.9	19.2	20.5	23.1	20.0
SD	14.2	13.8	15.2	15.5	15.0
Boys 12–17 years					
N	457	623	370	564	262
Mean	19.7	19.9	18.6	22.5	20.3
SD	15.1	15.0	15.3	17.0	16.4
Girls 12-17 years					
N	447	589	388	604	259
Mean	18.0	20.6	17.0	22.0	18.5
SD	16.5	15.9	14.9	17.7	15.3

D=Remschmidt & Walter (1990); NL=Verhulst et al. (1985); USA=Achenbach (1991) (4–18 year-olds); IL=Zilber et al. (1994) (6–16 year-olds)
Boys 6–11 y.: CH, IL<USA
Girls 6–11 y.: CH<NL<USA and D, IL<USA
Boys 12–17y.: CH, D, NL<USA
Girls 12–17 y.: CH, NL<D, USA and IL<USA ($p<0.01$)

Our effect analyses are mainly in accordance with the conclusions in the review by Verhulst and Achenbach (18). They noted sex-linked differences for the somatic compliant and the attention problem syndromes in at least five of the six cross-cultural comparisons they performed. These two differences were replicated by the present study. In addition, further significant sex effects were found for social problems, thought problems, delinquent and aggressive behavior where, in each instance, boys had higher scores. However, as is also shown in other analyses, the effects explained by sex in general had to be considered as being small.

In contrast to no consistent age effects on the syndrome scales, as stated in the review by Verhulst and Achenbach (18), we found significant but small effects for social problems, attention problems, and delinquent behavior only in the group of children aged 6 to 11 years. Furthermore, the comparison of a relatively small group of immigrant and indigenous children showed significant though small effects of nationality. Unfortunately, the relatively small sample size and the cultural heterogeneity of our immigrant group did not allow a comparison with other samples in which data were collected in the respective home country. Comparisons of this type could attempt to clarify whether or not immigrant children have CBCL scores that are more similar to those of children living in the host country or to those in their country of origin. Such studies could also contribute to answering the question of the cultural influence on parental perception of deviant child behavior. In any case, our data on the effects of nationality substantiate to some extent the concern of other authors with the difficulties of interpreting data obtained from culturally and ethnically diverse samples (9).

Finally, our test of convergence between the dimensional approach of the CBCL and the categorial approach of DSM-III-R-based diagnoses resulted in satisfactory differentiation of a group of children with either anxiety disorders or ADHD, or with a combination of these two diagnoses. This adds to previous studies in which similar findings were obtained for ADHD children with and without comorbidity (5) and for children with conduct disorders (10). Thus, there is evidence from various studies in support of the validity of the core syndromes assessed with the CBCL.

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